IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

MMB Docket No. **1781-0010**

Urquhart Reference: **SJB/P011888US** Confirmation No. **6005**

Application of: **Revie et al.** Group Art Unit: **3739**

Serial No. **10/505,304** Examiner: **Matthew John Kasztejna**

Filed: **July 11, 2005**

For: **Surgical Instrument System**

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SECOND APPEAL BRIEF

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Sir:

This is an appeal to the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office from the rejection of the claims 2-8,

12-16, 19-20, and 22-27 of the above-identified patent application. These claims have been finally rejected in an Office Action dated April 22, 2008. Please charge any and all government fees required for the filing of this Appeal Brief to Deposit Account No. 13-0014. Also, please provide any extensions of time that may be necessary and charge any fees that may be due to Deposit Account No. 13-0014, but not to include any payment of issue fees.

(1) REAL PARTY IN INTEREST

DePuy International Limited of Leeds, United Kingdom is the assignee of this patent application, and the real party in interest.

(2) RELATED APPEALS AND INTERFERENCES

None.

(3) STATUS OF CLAIMS

Claims 1, 9, 10, 11, 17, 18, and 21 are canceled.

Claims 2-8, 12-16, 19-20, and 22-27 are pending in the application.

Claims 2-8, 12-16, 19-20, and 22-27 are finally rejected.

Claims 2-8, 12-16, 19-20, and 22-27 are being appealed.

Claims 2-8, 12-16, 19-20, and 22-27 are shown in the Claim Appendix attached to this Appeal Brief.

(4) STATUS OF AMENDMENTS

Appellants have filed no amendments subsequent to the final rejection contained in the Office Action mailed April 22, 2008.

(5) SUMMARY OF CLAIMED SUBJECT MATTER

Claim 5 is summarized as follows:

A first aspect of Appellants' invention relates to a surgical instrument system that includes a drill bit 2 including an elongate shaft which defines axis, the shaft bearing a plurality of marker rings 10, 11, 12 arranged in a predetermined pattern on the surface of the shaft. (See, e.g., Appellants' Figs. 1 and 2; and specification at page 8, lines 1-9; and page 1, line 23 through page 2, line 8.) The system further includes at least two receiving devices 14 which are spaced apart for receiving stereoscopic signals from the rings on the drill bit. (See, e.g. Appellants' Fig. 1; specification at page 8, lines 13-17; and page 6, lines 5-11.) In addition, the system includes a data processor 16 for analysing the signal from the rings 10, 11, 12 and generating information relating to the position and orientation of the drill bit 2 relative to the receiving device. (See, e.g. Appellants' Fig. 1; specification at page 8, line 18 through page 9, line 10.) The system also includes a drive unit 8 operable to rotate the drill bit about the drill bit axis. (See, e.g., Appellants' Fig. 1; and specification at page 8, lines 6-7.)

Claims Dependent on Claim 5 are summarized as follows:

The marker rings 10, 11, 12 are more reflective than the surface of the shaft on which they are arranged. (See, e.g., Appellants' specification at page 5, lines 8-9.) Also, there are at least three marker rings 10, 11, 12. (See, e.g., Appellants' specification at page 4, line 9.) The distance between a first ring 10

and a second ring 11 which is adjacent to the first ring is the same as the distance between the said second ring 11 and a third ring 12 which is adjacent to the second ring 11 on the opposite side of the second ring 11 from the first ring 10. (See, e.g., Appellants' specification at page 4, lines 10-12.) The planes defined by the axially spaced edges of each ring 10, 11, 12 are parallel to one another and perpendicular to the drill bit axis. (See, e.g., Appellants' Fig. 1; and specification at page 2, lines 25-26.) The rings 10, 11, 12 are marked on a sleeve which is fitted to the surface of the drill bit 2. (See, e.g., Appellants' specification at page 6, lines 18-20.) A proximal portion 6 of the drill bit 2 bears the plurality of marker rings 10, 11, 12, and a distal portion 4 of the drill bit 2 bears a cutting surface. (See, e.g., Appellants' Figs. 1 and 2; and specification at page 8, lines 1-9.)

Claim 8 is summarized as follows:

Another aspect of Appellants' invention relates to a surgical instrument system that includes a reamer including an elongate shaft which defines an axis, the shaft bearing a plurality of marker rings 10, 11, 12 arranged in a predetermined pattern on the surface of the shaft. (See, e.g., Appellants' Figs. 1 and 2; specification at page 7, line 4; and specification at page 8, lines 1-9; and page 1, line 23 through page 2, line 8.) The system further includes at least two receiving devices 14 which are spaced apart for receiving stereoscopic signals from the rings 10, 11, 12 on the reamer. (See, e.g. Appellants' Fig. 1; specification at page 8, lines 13-17; page 6, lines 5-11; and page 1, line 23

through page 2, line 8.) Also, the system includes a data processor 16 for analysing the signal from the rings 10, 11, 12 and generating information relating to the position and orientation of the reamer relative to the receiving device. (See, e.g. Appellants' Fig. 1; specification at page 8, line 18 through page 9, line 10; and page 1, line 23 through page 2, line 8.) In addition, the system includes a drive unit 8 operable to rotate the reamer about the axis. (See, e.g., Appellants' Fig. 1; and specification at page 8, lines 6-7; and page 1, line 23 through page 2, line 8.) The reamer is configured to cut a patient's tissue during rotation of the reamer about the axis. (See, e.g., Appellants' Fig. 1; and specification at page 7, lines 6-7; page 1, line 23 through page 2, line 8; page 7, line 4; and page 1, lines 7-10.)

Claims Dependent on Claim 8 are summarized as follows:

The marker rings 10, 11, 12 are more reflective than the surface of the shaft on which they are arranged. (See, e.g., Appellants' specification at page 5, lines 8-9.) Also, there are at least three marker rings 10, 11, 12. (See, e.g., Appellants' specification at page 4, line 9.) The distance between a first ring 10 and a second ring 11 which is adjacent to the first ring is the same as the distance between the said second ring 11 and a third ring 12 which is adjacent to the second ring 11 on the opposite side of the second ring 11 from the first ring 10. (See, e.g., Appellants' specification at page 4, lines 10-12.) The planes defined by the axially spaced edges of each ring 10, 11, 12 are parallel to one another and perpendicular to the drill bit axis. (See, e.g., Appellants' Fig. 1; and

specification at page 2, lines 25-26.) The rings 10, 11, 12 are marked on a sleeve which is fitted to the surface of the drill bit 2. (See, e.g., Appellants' specification at page 6, lines 18-20.) A proximal portion 6 of the reamer bears the plurality of marker rings 10, 11, 12, and a distal portion 4 of the reamer bears a cutting surface. (See, e.g., Appellants' Figs. 1 and 2; specification at page 7, line 4; and specification at page 8, lines 1-9; and page 1, line 23 through page 2, line 8.)

Claim 19 is summarized as follows:

Still another aspect of Appellants' invention relates to a surgical instrument system that includes a tool 2 including an elongate shaft which defines a tool axis, the shaft bearing a plurality of marker rings 10, 11, 12 arranged in a predetermined pattern on the surface of the shaft so that they extend around the tool axis. (See, e.g., Appellants' Figs. 1 and 2; specification at page 7, line 4; and specification at page 8, lines 1-9; and page 1, line 23 through page 2, line 8.) The system further includes at least two receiving devices 14 which are spaced apart for receiving stereoscopic signals from the rings 10, 11, 12 on the tool 2. (See, e.g. Appellants' Fig. 1; specification at page 8, lines 13-17; page 6, lines 5-11; and page 1, line 23 through page 2, line 8.) In addition, the system includes a data processor 16 for analysing the signal from the rings 10, 11, 12 and generating information relating to the position and orientation of the tool 2 relative to the receiving device. (See, e.g. Appellants' Fig. 1; specification at page 8, line 18 through page 9, line 10; and page 1, line 23 through page 2, line 8.) The

system also includes a drive unit 8 for imparting rotational motion to the tool 2 and the tool 2 is one of a drill bit and a reamer, and each of the drill bit and the reamer is configured to cut a patient's tissue when it is made to rotate as a result of the rotational motion imparted to it by the drive unit 8. (See, e.g., Appellants' Fig. 1; and specification at page 8, lines 6-7; and page 1, line 23 through page 2, line 8; page 7, lines 4-7; page 1, line 23 through page 2, line 8; page 7, line 4; and page 1, lines 7-10.)

Claims Dependent on Claim 19 are summarized as follows:

The marker rings 10, 11, 12 are more reflective than the surface of the shaft on which they are arranged. (See, e.g., Appellants' specification at page 5, lines 8-9.) Also, there are at least three marker rings 10, 11, 12. (See, e.g., Appellants' specification at page 4, line 9.) The distance between a first ring 10 and a second ring 11 which is adjacent to the first ring is the same as the distance between the said second ring 11 and a third ring 12 which is adjacent to the second ring 11 on the opposite side of the second ring 11 from the first ring 10. (See, e.g., Appellants' specification at page 4, lines 10-12.) The planes defined by the axially spaced edges of each ring 10, 11, 12 are parallel to one another and perpendicular to the tool axis. (See, e.g., Appellants' Fig. 1; and specification at page 2, lines 25-26.) The rings 10, 11, 12 are marked on a sleeve which is fitted to the surface of the tool 2. (See, e.g., Appellants' specification at page 6, lines 18-20.) A proximal portion 6 of the tool 2 bears the plurality of marker rings 10, 11, 12, and a distal portion 4 of the tool bears a

cutting surface. (See, e.g., Appellants' Figs. 1 and 2; specification at page 7, line 4; and specification at page 8, lines 1-9; and page 1, line 23 through page 2, line 8.)

(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 2-6, 8, 12-15, 19-20, 22-23, and 25-27 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370).

Claims 7, 16, and 24 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370), and further in view of Ben-Haim et al. (U.S. Patent No. 6,203,493).

(7) ARGUMENT

I. First Rejection under 35 U.S.C. § 103 (Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370))

Claims 2-6, 8, 12-15, 19-20, 22-23, and 25-27 are not unpatentable as being obvious over Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370)

Discussion Regarding Patentability of Claim 5

Appellants' invention

During surgery, proper manipulation of surgical power tools having rotating drill bits or reaming tools such as disclosed in Kienzle has previously involved the provision of an appropriately visible marker (which can be used to define location and orientation information) on the drive unit of the surgical power tool. Such markers are commonly in the form of an array of reflective spheres in a pre-determined arrangement on the drive unit. Then, the location of the cutting tip of the drill bit or reamer can be derived from position data for the drive unit. However, this can involve some inaccuracy when the drill bit is not located accurately in the drive unit. Inaccuracy can also arise when the drill bit is subjected to bending forces when in use. These inaccuracies are reduced in the present invention by providing visible markers directly on the rotating drill bit or reamer itself. Thus, the invention involves moving the visible markers from a part of the surgical power tool that is relatively static and held by a surgeon's hand to a part of the surgical power tool that is rapidly driven and rotationally acted on a powered drive unit.

Proposed Combination and Examiner's Reasons for Combining

Presumably, in an attempt to arrive at the invention of Appellants' claim 5, the Examiner stated that "[i]t would have been obvious to one skilled in the art ... to place a plurality of marker rings around the shaft of the drill bit in the apparatus of Kienzle, III et al." (See Final Office Action at page 3, second to last line through page 4, line 1, and page 5, lines 10-14.) And further the Office Action states this would have been obvious "in order to more accurately define the location and orientation of the shaft as it enters the body as taught by Gillies et al." (See Office Action at page 4, lines 1-2, and page 5, lines 13-14.)

The Gillies Reference

Gillies teaches placing radio-opaque and MR-visible markers 6 on a distal end of a *cerebral catheter*. (See, e.g., the cerebral catheter 1 shown in Fig. 1; and discussed at column 25, lines 39-43.) Gillies' cerebral catheter 1 is a flexible drug delivery tube that is advanced to an affected site in a patient's brain (e.g. a brain tumor) through which drugs are delivered to the affected site. The cerebral catheter 1 is made of a soft, biocompatible plastics material. (See, e.g., Gillies at column 25, lines 43-45.) Thus, Gillies teaches placing opaque markers on the distal end of a soft, flexible cerebral catheter.

It is Not Reasonable to Combine Kienzle and Gillies as Proposed

It would not have been reasonable for one skilled in the art to place a plurality of markers around the shaft of the drill bit in the apparatus of Kienzle based on the teachings in Gillies. Indeed, Appellants' invention of claim 5 recites a drill bit which is driven to rotate about its axis by a drive unit, the shaft of the drill bit bearing a plurality of marker rings. Drill bits are, of course, configured to cut materials so as to create a cavity in an object, such as a proximal femur. (See, e.g., Kienzle at Fig. 4.) Many different technical issues exist with respect to the use of a soft, flexible cerebral catheter in comparison to the use a power-driven, rigid drill bit. Indeed, the exposed surface of a drill bit is subjected to significant friction during a drilling operation. By placing a plurality of marker rings around the distal end of Kienzle's drill bit, in a manner similar to Gillies' placement of radiopaque markers 6 around the distal end of its soft, flexible cerebral catheter 1, the marker rings on the distal end of Kienzle's drill bit would be subjected to a significant amount of friction during a drilling operation. This frictional contact would likely result in the wearing off of the marker rings from the shaft of the drill bit. No similar wearing issues exist with respect to use of Gillies' cerebral catheter. Significantly, the outer surface of a cerebral catheter would not be subjected to such high friction since the catheter would be gently advanced within the brain of a patient by a surgeon. In Appellants' invention of claim 5, the system extrapolates the location of the cutting surfaces (the distal part of the drill bit that is embedded in bone tissue) from the proximal portion of the drill bit (carrying the marker rings) that is *visible* to the at least two receiving

devices (e.g. cameras). Thus, even though the plurality of marker rings is located on the drill bit, they remain visible to the receiving devices (e.g. cameras) outside the bone tissue, and thus not subject to potentially destructive high friction. Accordingly, one skilled in the art would not find it reasonable to place a plurality of markers around the shaft of the drill bit in the apparatus of Kienzle based on the teachings in Gillies.

Moreover, the Gillies reference teaches placing machine readable markers on a medical component whose movement in relation to a patient's body is caused solely by a corresponding movement of a surgeon's hand. This teaching is already consistent with the design of the Kienzle drill apparatus. Indeed, machine readable markers are placed on the drill housing 115 (or drill guide 110) of the Kienzle, the movement of each in relation to a patient's body being caused only by corresponding movement of a surgeon's hand. Modifying the drill apparatus of Kienzle so that the machine readable markers are now placed on a power-driven drill bit whose movement is predominantly derived by a powered drive unit is not what one skilled in the art would reasonably do based on the teachings of Gillies.

For any or all the reasons set forth above, the proposed combination of Kienzle in view of Gillies does not establish a prima facie case of obviousness under 35 U.S.C. § 103 with regard to the invention of claim 5.

Additional Considerations

It should be further noted that the use of marker *rings* on the shaft of a drill bit has the advantage that the rings appear as lines as the drill bit shaft rotates about its axis. This facilitates the generation of location and orientation information in a way that is elegant and simple in comparison with the technique which is disclosed in Kienzle, where the visible marker devices are fixed on the drive unit housing (or drill guide). Thus, claim 5 is further allowable over the cited art.

Discussion re: Patentability of Claims 2, 3, 4, 6, and 25

Each of claims 2, 3, 4, 6, and 25 depends directly or indirectly from claim 5. As a result, each of claims 2, 3, 4, 6, and 25 is allowable for, at least, the reasons hereinbefore discussed with regard to claim 5.

Discussion re: Patentability of Claim 8

The discussion relating to the patentability of claim 5 is relevant to the patentability of claim 8. In particular, it would not have been reasonably obvious to one skilled in the art to place a plurality of markers around the shaft of the cutting tool in the apparatus of Kienzle based on the teachings in Gillies for at least the reasons hereinabove discussed with respect to claim 5. As a result, the proposed combination of Kienzle in view of Gillies does not establish a prima facie case of obviousness under 35 U.S.C. § 103 with regard to the invention of claim 8.

Discussion re: Patentability of Claims 13-15 and 26

Each of claims 13-15 and 26 depends directly or indirectly from claim 8. As a result, each of claims 13-15 and 26 is allowable for, at least, the reasons hereinbefore discussed with regard to claim 8.

Discussion re: Patentability of Claim 19

The discussion relating to the patentability of claim 5 is relevant to the patentability of claim 19. In particular, it would not have been reasonably obvious to one skilled in the art to place a plurality of markers around the shaft of the cutting tool in the apparatus of Kienzle based on the teachings in Gillies for at least the reasons hereinabove discussed with respect to claim 5. As a result, the proposed combination of Kienzle in view of Gillies does not establish a prima facie case of obviousness under 35 U.S.C. § 103 with regard to the invention of claim 19.

Discussion re: Patentability of Claims 20-23 and 27

Each of claims 20-23 and 27 depends directly or indirectly from claim 19. As a result, each of claims 20-23 and 27 is allowable for, at least, the reasons hereinbefore discussed with regard to claim 19.

Further Discussion re: Patentability of Claims 25, 26, and 27

Claim 25 recites a system as claimed in claim 5,

> in which a proximal portion of the drill bit bears the plurality of marker rings, and
> in which a distal portion of the drill bit bears a cutting surface.

Appellants' system extrapolates the location of the cutting surfaces (the distal part of the drill bit that is embedded in bone tissue) from the proximal portion of the drill bit (carrying the marker rings) that is *visible* to the at least two receiving devices (e.g. cameras). Thus, even though the plurality of marker rings is located on the drill bit, they remain visible to the receiving devices (e.g. cameras) outside the bone tissue, and thus not subject to potentially destructive high friction. Thus, providing the plurality of markers on a proximal portion of a drill bit while a distal portion of the drill bit bears a cutting surface as specifically called for in claim 25 is further unique and non-obvious in relation to the cited art.

In rejecting claim 25, the Examiner stated that "Gillies et al. teach of placing the MR-visible markers along its length, having marker placed at a proximal portion of the shaft (see Col. 13, Lines 23-30)." (See Final Office Action at page 3, lines 18-20.) However, Gillies merely teaches placing machine readable markers on a medical component whose movement in relation to a patient's body is caused solely by a corresponding movement of a surgeon's hand. Thus, at best, Gillies would suggest to one skilled in the art to place machine readable markers along the length of Kienzle's drill housing 110 (or its drill guide 110), components whose movement are caused solely by

corresponding movement of a surgeon's hand. However, modifying Gillies in that manner would not result in a system which arrives at the invention of Appellants' claim 25. Thus, the proposed combination of Kienzle in view of Gillies further does not establish a prima facie case of obviousness under 35 U.S.C. § 103 with regard to the invention of claim 25.

For substantially the same reasons discussed above with respect to the patentability of claim 25, the proposed combination of Kienzle in view of Gillies further does not establish a prima facie case of obviousness under 35 U.S.C. § 103 with regard to the invention of claims 26 and 27.

II. Second Rejection under 35 U.S.C. § 103 (Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370), and further in view of Ben-Haim et al. (U.S. Patent No. 6,203,493))

Claims 7, 16, and 24 are not unpatentable as being obvious over Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370), and further in view of Ben-Haim et al. (U.S. Patent No. 6,203,493)

Claim 7 depends directly from claim 5. As a result, claim 7 is allowable for, at least, the reasons hereinbefore discussed with regard to claim 5. Claim 16 depends directly from claim 8. As a result, claim 16 is allowable for, at least, the reasons hereinbefore discussed with regard to claim 8. Claim 24 depends directly from claim 19. As a result, claim 24 is allowable for, at least, the reasons hereinbefore discussed with regard to claim 19.

III. Conclusion

Claims 2-6, 8, 12-15, 19-20, 22-23, and 25-27 are not unpatentable as being obvious over Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370), and the Board of Appeals is respectfully requested to reverse this rejection of these claims.

Claims 7, 16, and 24 stand rejected under 35 U.S.C. § 103 are not unpatentable as being obvious over Kienzle III et al. (U.S. Patent No. 6,478,802) in view of Gillies et al. (U.S. Patent No. 6,272,370), and further in view of Ben-Haim et al. (U.S. Patent No. 6,203,493), and the Board of Appeals is respectfully requested to reverse this rejection of these claims.

Respectfully submitted,

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(8) CLAIM APPENDIX

2. A system as claimed in claim 5, in which the marker rings are more reflective than the surface of the shaft on which they are arranged.

3. A system as claimed in claim 5, in which there are at least three marker rings.

4. A system as claimed in claim 3, in which the distance between a first ring and a second ring which is adjacent to the first ring is the same as the distance between the said second ring and a third ring which is adjacent to the second ring on the opposite side of the second ring from the first ring.

5. A surgical instrument system, which comprises:

a. a drill bit including an elongate shaft which defines a drill bit axis, the shaft bearing a plurality of marker rings arranged in a predetermined pattern on the surface of the shaft,

b. at least two receiving devices which are spaced apart for receiving stereoscopic signals from the rings on the drill bit,

c. a data processor for analysing the signal from the rings and generating information relating to the position and orientation of the drill bit relative to the receiving device, and

d. a drive unit operable to rotate the drill bit about the drill bit axis.

6. A system as claimed in claim 5, in which the planes defined by the axially spaced edges of each ring are parallel to one another and perpendicular to the drill bit axis.

7. A system as claimed in claim 5, in which the rings are marked on a sleeve which is fitted to the surface of the drill bit.

8. A surgical instrument system, which comprises:

a. a reamer including an elongate shaft which defines an axis, the shaft bearing a plurality of marker rings arranged in a predetermined pattern on the surface of the shaft,

b. at least two receiving devices which are spaced apart for receiving stereoscopic signals from the rings on the reamer, ~~and~~

c. a data processor for analysing the signal from the rings and generating information relating to the position and orientation of the reamer relative to the receiving device, and

a drive unit operable to rotate the reamer about the axis,

wherein the reamer is configured to cut a patient's tissue during rotation of the reamer about the axis.

12. A system as claimed in claim 8, in which the marker rings are more reflective than the surface of the shaft on which they are arranged.

13. A system as claimed in claim 8, in which there are at least three marker rings.

14. A system as claimed in claim 13, in which the distance between a first ring and a second ring which is adjacent to the first ring is the same as the distance between the said second ring and a third ring which is adjacent to the second ring on the opposite side of the second ring from the first ring.

15. A system as claimed in claim 8, in which the planes defined by the axially spaced edges of each ring are parallel to one another and perpendicular to the axis.

16. A system as claimed in claim 8, in which the rings are marked on a sleeve which is fitted to the surface of the reamer.

19. A surgical instrument system, which comprises:

a tool including an elongate shaft which defines a tool axis, the shaft bearing a plurality of marker rings arranged in a predetermined pattern on the surface of the shaft so that they extend around the tool axis,

at least two receiving devices which are spaced apart for receiving stereoscopic signals from the rings on the tool,

a data processor for analysing the signal from the rings and generating information relating to the position and orientation of the tool relative to the receiving device, and

a drive unit for imparting rotational motion to the tool,

wherein the tool is one of a drill bit and a reamer, and

wherein each of the drill bit and the reamer is configured to cut a patient's tissue when it is made to rotate as a result of the rotational motion imparted to it by the drive unit.

20. A system as claimed in claim 19, in which the marker rings are more reflective than the surface of the shaft on which they are arranged.

22. A system as claimed in claim 21,

in which there are at least three marker rings, and

in which the distance between a first ring and a second ring which is adjacent to the first ring is the same as the distance between the said second ring and a third ring which is adjacent to the second ring on the opposite side of the second ring from the first ring.

23. A system as claimed in claim 19, in which the planes defined by the axially spaced edges of each ring are parallel to one another and perpendicular to the tool axis.

24. A system as claimed in claim 19, in which the rings are marked on a sleeve which is fitted to the surface of the tool.

25. A system as claimed in claim 5,

in which a proximal portion of the drill bit bears the plurality of marker rings, and

in which a distal portion of the drill bit bears a cutting surface.

26. A system as claimed in claim 8,

in which a proximal portion of the reamer bears the plurality of marker rings, and

in which a distal portion of the reamer bears a cutting surface.

27. A system as claimed in claim 19,

in which a proximal portion of the tool bears the plurality of marker rings, and

in which a distal portion of the tool bears a cutting surface.

(9) EVIDENCE APPENDIX

None.

(10) RELATED PROCEEDINGS APPENDIX

None.